MINKE WHALE (*Balaenoptera acutorostrata scammoni*):
Hawaii Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The International Whaling Commission (IWC) recognizes 3 stocks of minke whales in the North Pacific: one in the Sea of Japan/East China Sea, one in the rest of the western Pacific west of 180ºN, and one in the "remainder" of the Pacific (Donovan 1991). The "remainder" stock only reflects the lack of exploitation in the eastern Pacific and does not imply that only one population exists in that area (Donovan 1991). In the "remainder" area, minke whales are relatively common in the Bering and Chukchi seas and in the Gulf of Alaska, but are not considered abundant in any other part of the eastern Pacific (Leatherwood *et al*. 1982, Brueggeman *et al*. 1990). In the Pacific, minke whales are usually seen over continental shelves (Brueggeman *et al*. 1990). In the extreme north, minke whales are believed to be migratory, but in inland waters of Washington and in central California they appear to establish home ranges (Dorsey *et al*. 1990).
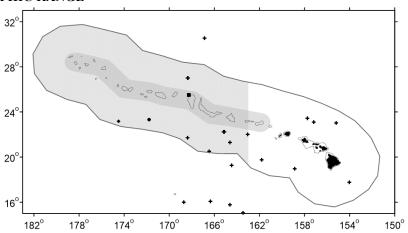
Minke whales occur seasonally

Figure 1. Locations of minke whale sightings from longline observer records (crosses; NMFS/PIR, unpublished data), and sighting locations during the 2002 (diamond), 2010 (circle), and 2017 (square) shipboard surveys of U.S. EEZ waters surrounding the Hawaiian Islands (Barlow 2006, Bradford *et al*. 2013, Yano *et al*. 2018). Outer line indicates approximate boundary of survey area and U.S. EEZ. Dark gray shading indicates the original Papahanaumokuakea Marine National Monument, with the lighter gray shading denoting the full 2016 Expansion area. Dotted line represents the 1000 m isobath.

around the Hawaiian Islands (Barlow 2003, Rankin and Barlow, 2005), and their migration routes or destinations are unknown. Minke whale "boing" sounds have been detected near the Hawaiian Islands for decades, with detections by the U.S. Navy during February and March (Thompson and Friedl 1982) and at the ALOHA Cabled Observatory 100km north of Oahu from October to May (Oswald *et al*. 2011). Three confirmed sightings of minke whale were made, one in 2002, one in 2010, and one in 2017 during shipboard surveys of waters within the U.S. Exclusive Economic Zone (EEZ) of the Hawaiian Islands (Barlow 2003, Bradford *et al*. 2013, Yano *et al*. 2018).

For the Marine Mammal Protection Act (MMPA) stock assessment reports, there are three stocks of minke whale within the Pacific U.S. EEZ: 1) a Hawaiian stock (this report), 2) a California/Oregon/ Washington stock, and 3) an Alaskan stock. The Hawaiian stock includes animals found both within the Hawaiian Islands EEZ and in adjacent high seas waters; however, because data on abundance, distribution, and human-caused impacts are largely lacking for high seas waters, the status of this stock is evaluated based on data from U.S. EEZ waters of the Hawaiian Islands (NMFS 2005).

POPULATION SIZE

Encounter data from a 2017 summer/fall shipboard line-transect surveys of the entire Hawaiian Islands EEZ were used to estimate the seasonal abundance of minke whales in Hawaiian waters. The design-based abundance estimate for 2017 is 438 (CV = 1.05) animals in the Hawaiian EEZ during the summer/fall (Bradford *et al*. 2021). The abundance estimate used sighting data from throughout the central Pacific to estimate the detection function and Beaufort sea-state-specific trackline detection probabilities for minke whales from Barlow *et al*. (2015). Summer/fall 2002 and 2010 shipboard line-transect surveys of the Hawaiian EEZ each resulted in one 'off effort' sighting of a minke whale (Barlow 2003, Bradford *et al*. 2013). These sightings were not part of regular survey operations and, therefore, could not be used to calculate estimates of abundance. The majority of each of these surveys took place during summer and early fall, when the Hawaiian stock of minke whale would be expected to be farther north. Using passive acoustic detections from an array of seafloor hydrophones north of Kauai, Martin *et al*. (2012) estimate a

preliminary average density of 2.15 "boing" calling minke whales per 1000 km^2 during the period February through April and within an area of 8,767 km^2 centered on the seafloor array positioned roughly 50km from shore. However, the relationship between the number of whales present and the number of calls detected is not known, and therefore this acoustic method does not provide an estimate of absolute abundance for minke whales.

Minimum Population Estimate

The minimum population size is calculated as the lower 20th percentile of the log-normal distribution (Barlow *et al.* 1995) of the 2017 abundance estimate or 212 minke whales.

Current Population Trend

No data are available on population size or current population trend.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

No data are available on current or maximum net productivity rate for Hawaiian minke whales.

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for the Hawaii stock of minke whales is calculated as the minimum population estimate (212) <u>times</u> one half the default maximum net growth rate for cetaceans (½ of 4%) <u>times</u> a recovery factor of 0.50 (for a species of unknown status with no estimated fishery mortality or serious injury within the U.S. EEZ of the Hawaiian Islands; Wade and Angliss 1997) resulting in a PBR of 2.1 minke whales per year

HUMAN CAUSED MORTALITY AND SERIOUS INJURY

Fishery Information

Information on fishery-related mortality and serious injury of cetaceans in Hawaiian waters is limited, but the gear types used in Hawaiian fisheries are responsible for marine mammal mortality and serious injury in other fisheries throughout U.S. waters. There are currently two distinct longline fisheries based in Hawaii: a deep-set longline (DSLL) fishery that targets primarily tunas, and a shallow-set longline fishery (SSLL) that targets swordfish. Both fisheries operate within U.S. waters and on the high seas. Between 2014 and 2018, no minke whales were observed hooked or entangled in the SSLL fishery (100% observer coverage) or the DSLL fishery (18-22% observer coverage) (Bradford 2018a, 2018b, 2020, Bradford and Forney 2017).

STATUS OF STOCK

The Hawaii stock of minke whales is not considered strategic under the 1994 amendments to the MMPA. The status of minke whales in Hawaiian waters relative to OSP is unknown, and there are insufficient data to evaluate trends in abundance. Minke whales are not listed as "threatened" or "endangered" under the Endangered Species Act (1973), nor designated as "depleted" under the MMPA. Because there has been no reported fisheries related mortality or serious injury within the Hawaiian Islands EEZ, the total fishery mortality and serious injury for minke whales can be considered insignificant and approaching zero mortality and serious injury rate. A recent examination of the behavioral response of minke whales to mid-frequency sonar transmissions within the Pacific Missile Range Facility north of Kauai indicated a reduction in minke whale calling during sonar operations (Harris *et al*. 2019). Whether the reduction in calling was the result of displacement or a change in vocal behavior could not be determined with the data available, but does suggest that minke whales are responsive to military sonar activity within their range. The increasing level of anthropogenic sound in the world's oceans has been suggested to be a habitat concern for whales (Richardson *et al*. 1995). Minke whale increase the source level of their calls during periods of higher ambient noise, though are either unable or unwilling to increase calling levels at the same rate as increases in noise (Helble *et al*. 2020) suggesting masking of calls will occur at high noise levels.

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